

US009338539B2

(12) **United States Patent**
Chen

(10) **Patent No.:** **US 9,338,539 B2**
(45) **Date of Patent:** **May 10, 2016**

(54) **IN-EAR-CANAL HEADSET ASSEMBLY**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 20 days.

(21) Appl. No.: **14/329,919**

(22) Filed: **Jul. 12, 2014**

(65) **Prior Publication Data**

US 2016/0014493 A1 Jan. 14, 2016

(51) **Int. Cl.**

H04R 1/10 (2006.01)

H04R 1/08 (2006.01)

H04R 1/28 (2006.01)

(52) **U.S. Cl.**

CPC **H04R 1/1016** (2013.01); **H04R 1/083** (2013.01); **H04R 1/2807** (2013.01); **H04R 2201/107** (2013.01)

(58) **Field of Classification Search**

CPC H04R 2225/023; H04R 2225/025; H04R 1/10; H04R 2205/022; H04R 1/105; H04R 5/0335; H04R 2201/10; H04R 2460/13; H04R 1/1016

USPC 381/328, 370-371, 374-375, 380-382
See application file for complete search history.

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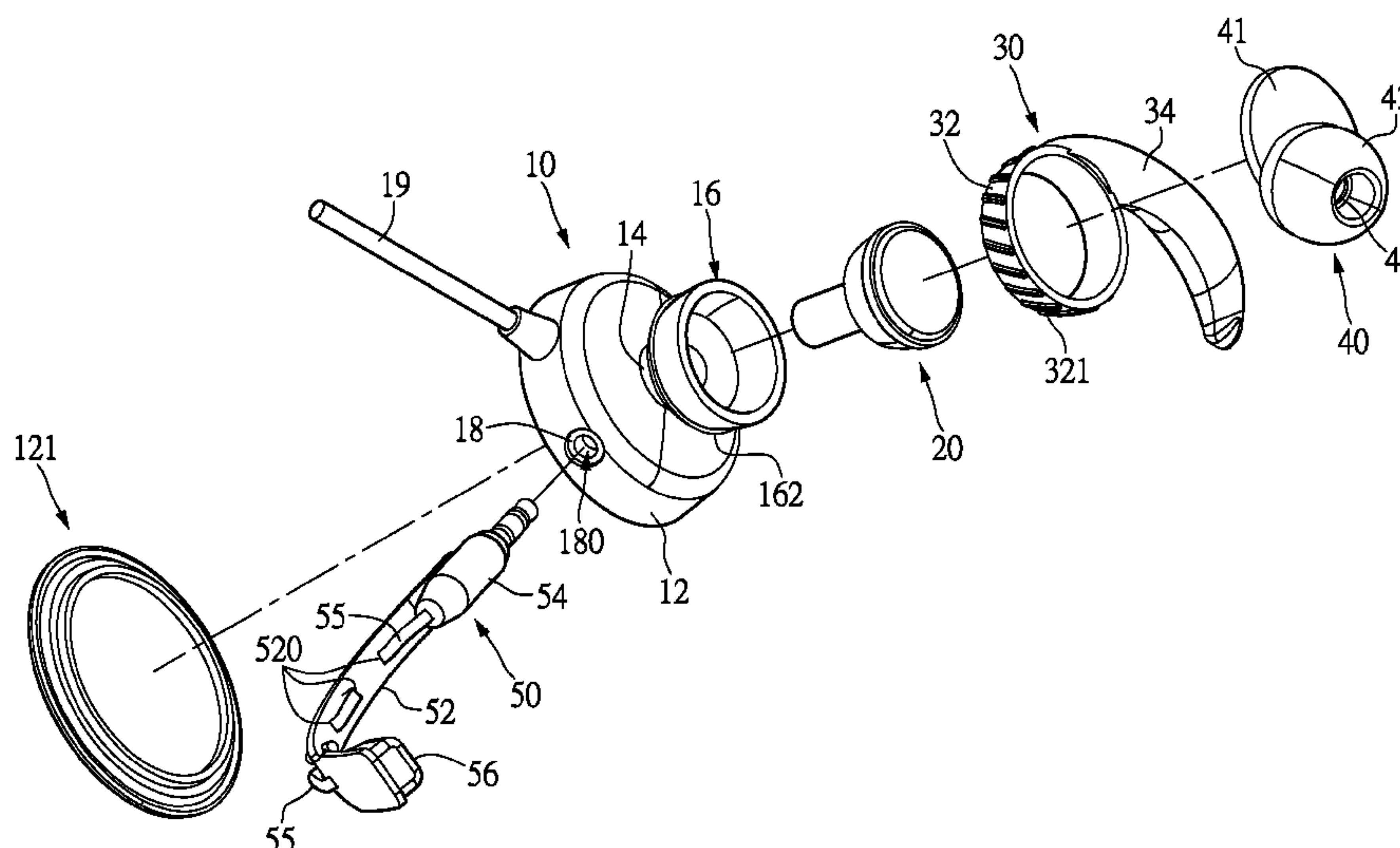
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(57) **ABSTRACT**

An in-ear-canal headset assembly includes an accommodating housing, a speaker unit, a fixing unit, an in-ear unit and a microphone unit. The accommodating housing has a resonance chamber, a sound chamber in air communication with the resonance chamber, and an outer cover covering the resonance chamber. The resonance chamber receives a socket therein. The speaker unit is received in the sound chamber. The fixing unit has a ring portion disposed around the sound chamber and a hooking portion connected to the ring portion. The in-ear unit has a covering lid covering the sound chamber, a wave-guiding tube extending from the covering lid, and a flexible tip fixed on the wave-guiding tube. The microphone unit has an arm, an earphone plug, a microphone disposed on an end of the arm, and a connecting cord arranged on the arm for electrically connecting the earphone plug to the microphone.

9 Claims, 7 Drawing Sheets



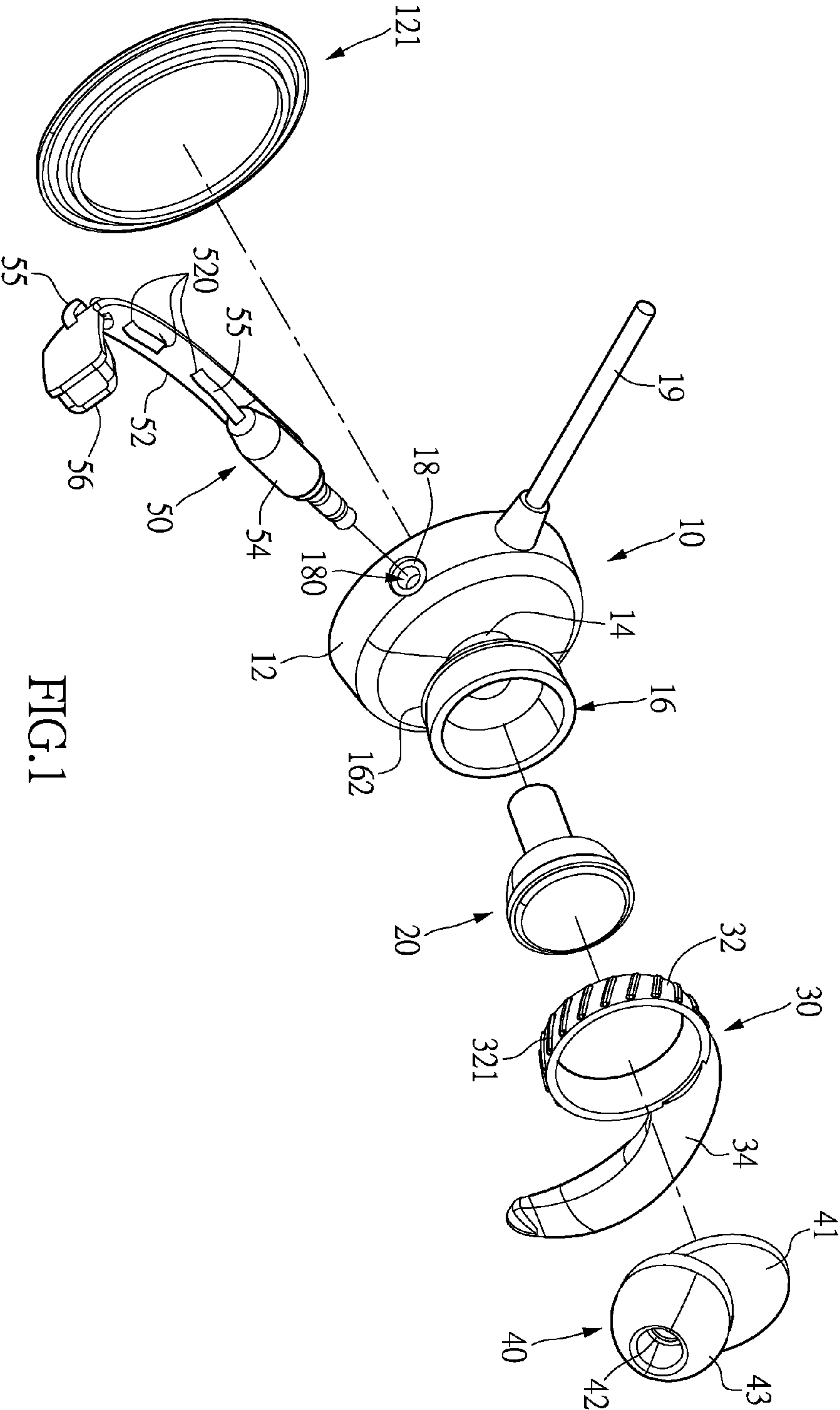


FIG.1

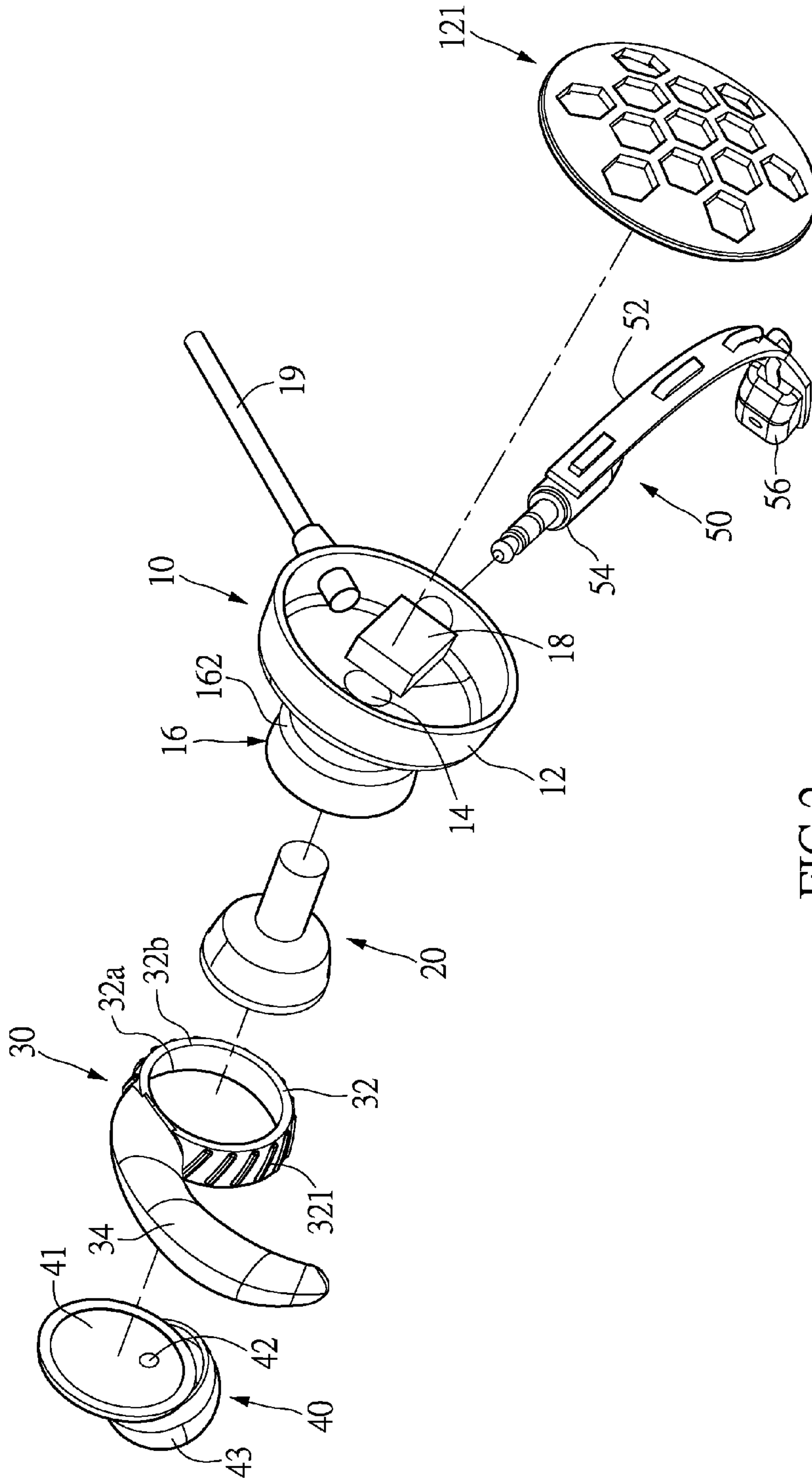


FIG.2

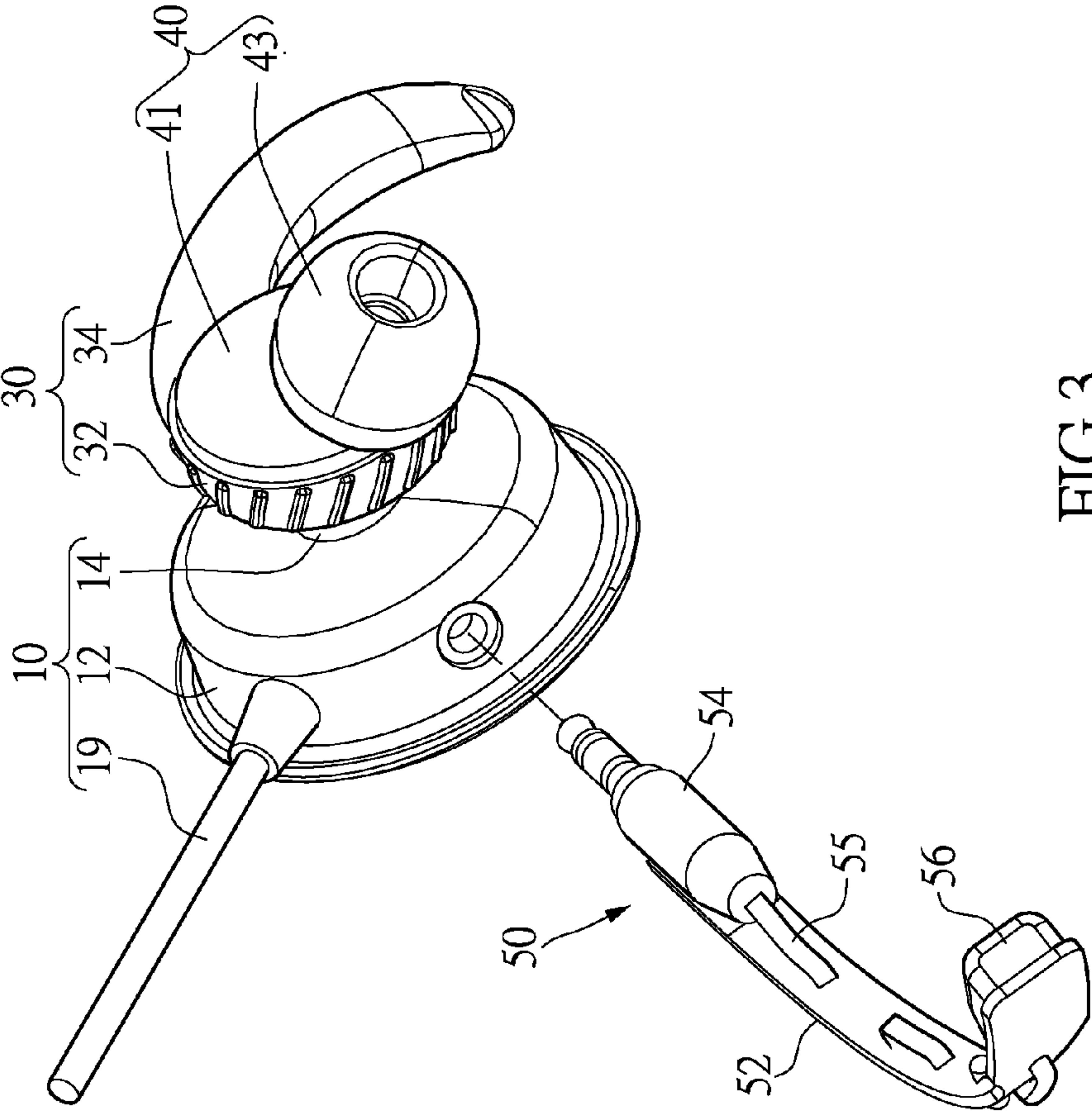


FIG.3

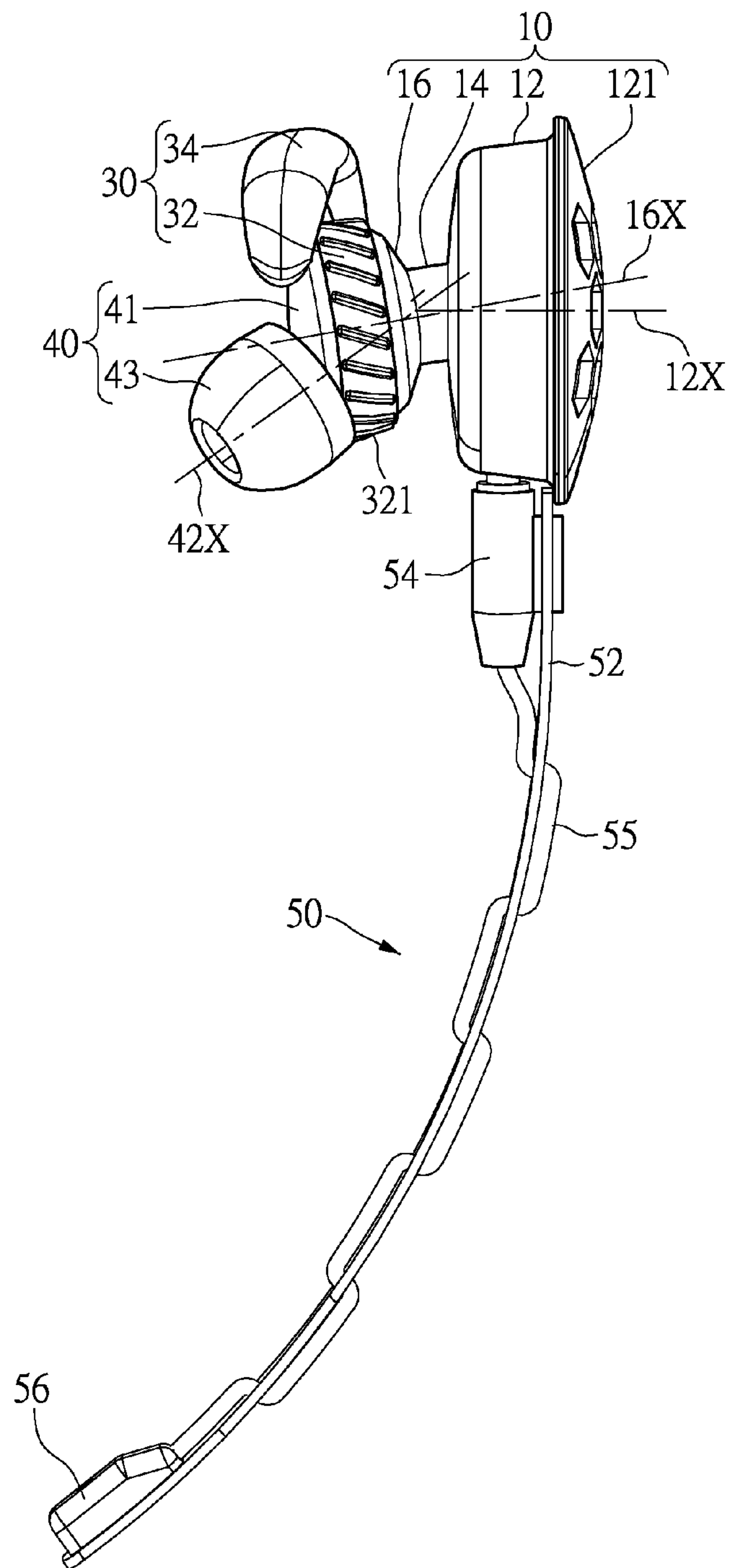


FIG. 4

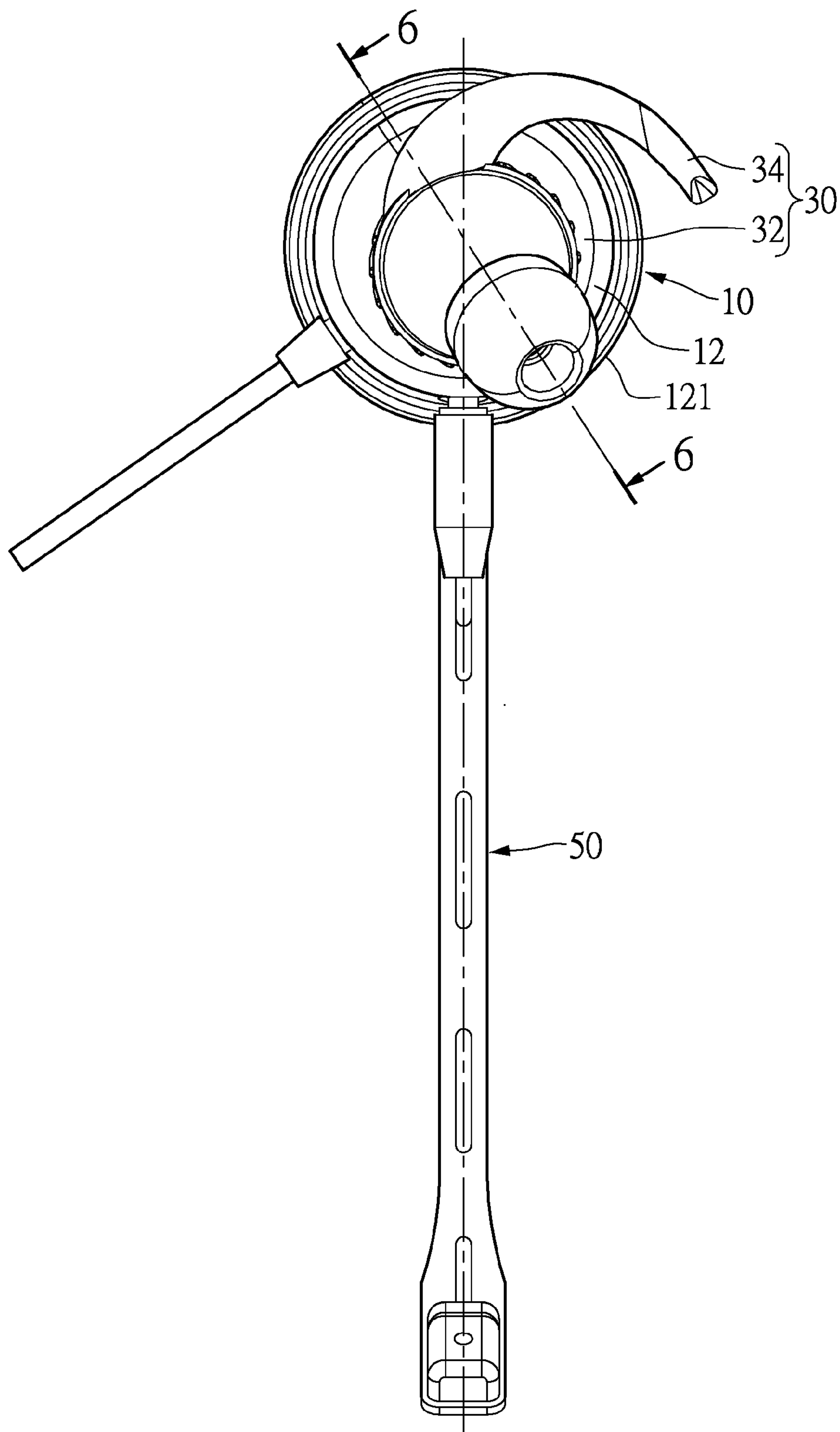


FIG.5

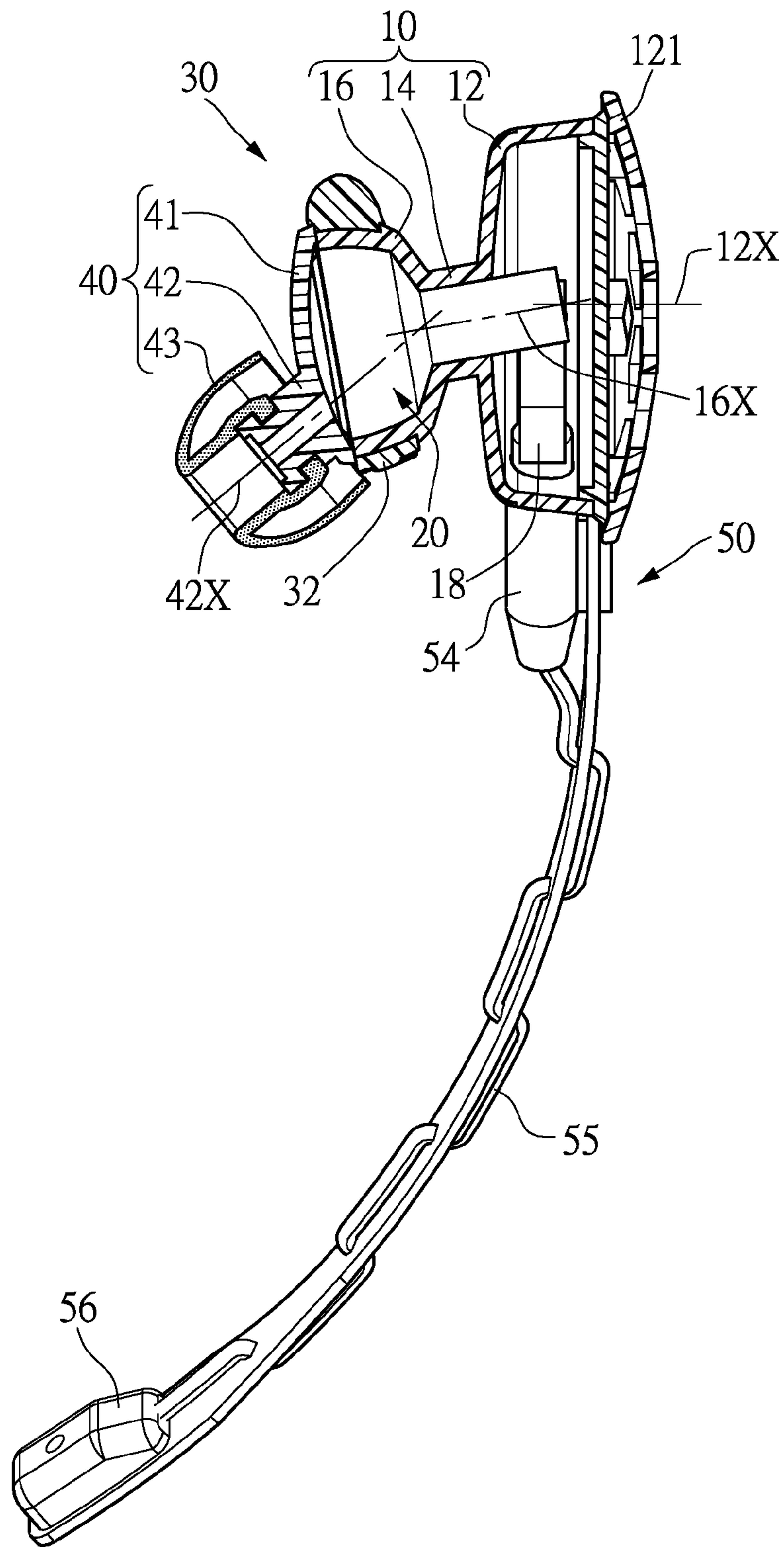


FIG. 6

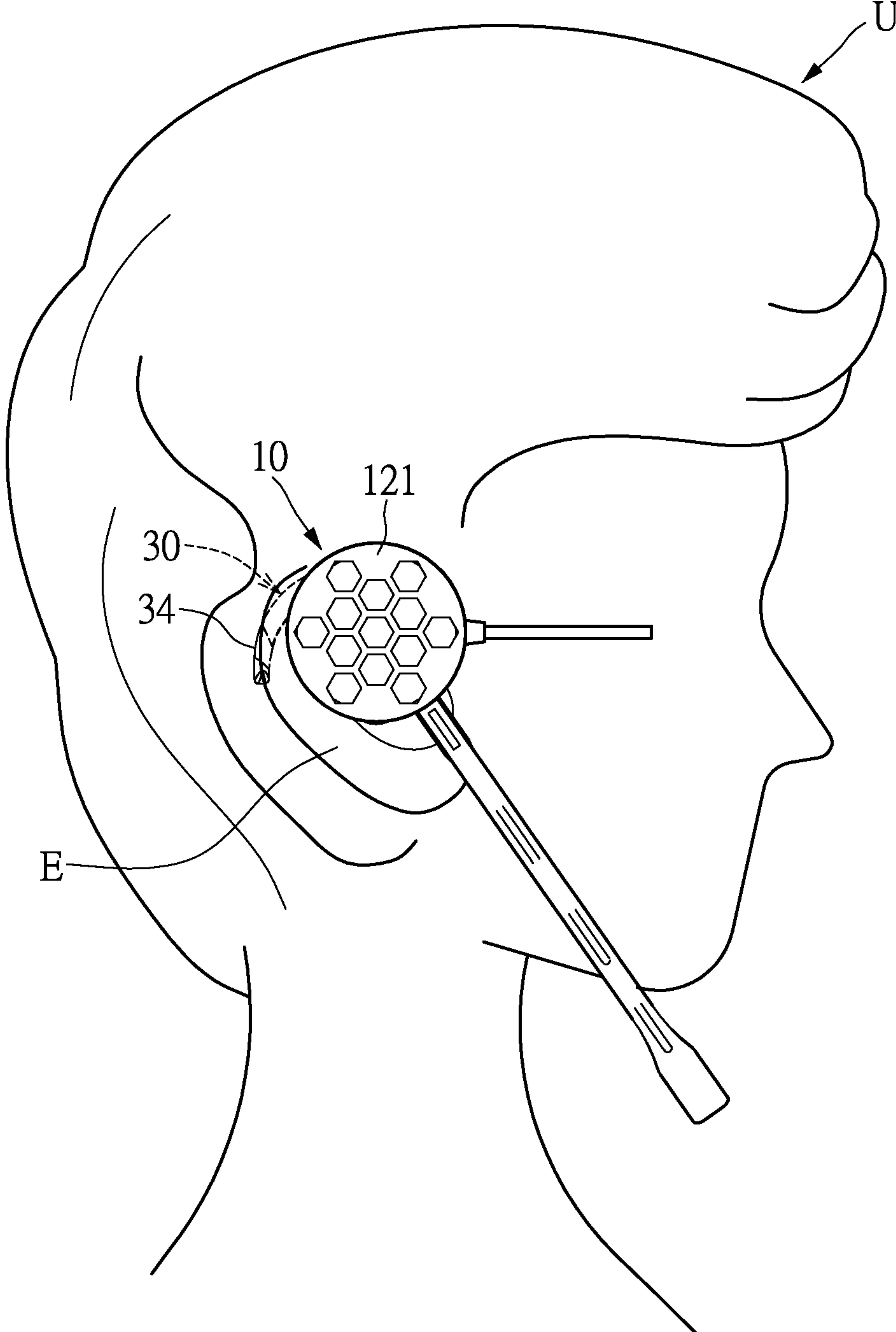


FIG.7

IN-EAR-CANAL HEADSET ASSEMBLY

BACKGROUND

1. Field of the Invention

The instant disclosure relates to an in-ear-canal headset assembly; in particular, to a headset which combines a canal-
phone and a microphone.

2. Description of Related Art

To improve the sound-insulation effect of earphone, canal-
phones also called in-ear earphone or generally called In-Ear-
Monitor (IEM), has been developed. Canalphones are a spe-
cific type of earphone that is meant to seal the opening of your
ear canal (external acoustic meatus) by inserting a rubber tip
to prevent interference from ambient sound. Therefore, the
ambient noise can be reduced and a better seal characteristic
is provided.

A headset is a device that combines a headphone with a
microphone. If in-ear earphones are applied to a headset,
which could be called in-ear-canal headset, the total weight of
the headset is increased because a microphone unit is added.
Since the in-ear earphones are only fixed by inserting the
rubber tip at the entrance of user's ear canal, to wear the
in-ear-canal headset on user's ear will cause some difficulty.
Because the microphone is extended from the ear toward the
mouth, a rotating torque exists which can easily affect the
wearing stability of in-ear headset.

BRIEF SUMMARY OF THE INVENTION

The instant disclosure provides an in-ear-canal headset
assembly, which combines a microphone with an in-ear ear-
phone and enhances the wearing stability for user.

In addition, the instant disclosure further provides an in-
ear-canal headset assembly, which provides a light micro-
phone unit combined with the in-ear earphone to reduce the
total weight of microphone unit and increase wearing stabil-
ity of in-ear-canal headset assembly.

According to one exemplary embodiment of the instant
disclosure, an in-ear-canal headset assembly is disclosed,
which includes an accommodating housing, a speaker unit, a
fixing unit, an in-ear unit and a microphone unit. The accom-
modating housing has a resonance chamber, a sound chamber
in air communication with the resonance chamber, and an
outer cover arranged at a side of the resonance chamber. A
socket is received in the resonance chamber. The speaker unit
is received in the sound chamber. The fixing unit has a ring
portion and a hooking portion connected to a periphery of the
ring portion. The ring portion is disposed around a periphery
of the sound chamber. The hooking portion is rested on a
user's auricle. The in-ear unit has a covering lid covering the
sound chamber, a wave-guiding tube extending outward from
the covering lid, and a flexible tip connected to the wave-
guiding tube. The microphone unit has an arm, an earphone
plug disposed at one end of the arm and plugged in the socket,
a microphone disposed at another end of the arm, and a
connecting cord arranged on the arm. The earphone plug is
extending along a longitudinal direction of the arm. The con-
necting cord is electrically connected to the earphone plug
and the microphone.

According to one embodiment of the instant disclosure, the
arm of the microphone unit is a plate shaped and has a plu-
rality of through holes formed thereon and two sides. The
connecting cord is passed through the through holes circu-
larly and arranged at the two sides of the arm alternately in
a wavelike pattern.

The instant disclosure has benefits as followed. The in-ear-
canal headset assembly of the instant disclosure includes a
fixing unit. The fixing unit has a ring portion and a hooking
portion connected to the ring portion. The hooking portion
can be rested on the user's auricle to increase the wearing
stability. Further, the ring portion can provide friction force
against the ear to increase fixing ability.

In order to further understand the instant disclosure, the
following embodiments are provided along with illustrations
to facilitate the appreciation of the instant disclosure; how-
ever, the appended drawings are merely provided for refer-
ence and illustration, without any intention to be used for
limiting the scope of the instant disclosure.

BRIEF DESCRIPTION OF THE SEVERAL
VIEWS OF THE DRAWINGS

FIG. 1 is a perspective exploded view of an in-ear-canal
headset assembly of the instant disclosure;

FIG. 2 is another perspective exploded view of the in-ear-
canal headset assembly of the instant disclosure;

FIG. 3 is a perspective view of the in-ear-canal earphone
separated from a microphone of the instant disclosure;

FIG. 4 is front view of the in-ear-canal headset assembly of
the instant disclosure;

FIG. 5 is a side view of the in-ear-canal headset assembly
of the instant disclosure;

FIG. 6 is a cross-sectional view along a line 6-6 in FIG. 5 of
the instant disclosure; and

FIG. 7 is a perspective view showing the in-ear-canal head-
set assembly of the instant disclosure being worn.

DETAILED DESCRIPTION OF THE INVENTION

The aforementioned illustrations and following detailed
descriptions are exemplary for the purpose of further explain-
ing the scope of the instant disclosure. Other objectives and
advantages related to the instant disclosure will be illustrated
in the subsequent descriptions and appended drawings.

Please refer to FIGS. 1 and 2 as the perspective exploded
views of an in-ear-canal headset assembly. The instant dis-
closure provided an in-ear-canal headset assembly, which has
an accommodating housing 10, a speaker unit 20, a fixing unit
30, an in-ear unit 40, and a microphone unit 50.

The accommodating housing 10 has a resonance chamber
12, a sound chamber 16 in air communication with the reso-
nance chamber 12, and an outer cover 121 is arranged at a side
of the resonance chamber 12. Further, there is a socket 18
received in the resonance chamber 12. In this embodiment,
the accommodating housing 10 further includes a neck por-
tion 14 in air communication the resonance chamber 12 with
the sound chamber 16. The sound chamber 16 has a ring-
shaped blocking protrusion 162 formed on an outer surface
thereof adjacent to the neck portion 14.

The speaker unit 20 is received in the sound chamber 16.
The speaker unit 20 has a sound-playing side opposite to the
resonance chamber 12. The speaker unit 20 can be moving-
coil type or balanced armature, or a combination of both.

The fixing unit 30 includes a ring portion 32 and a hooking
portion 34 connected to a periphery of the ring portion 32. The
fixing unit 30 could be made of flexible plastic. The hooking
portion 34 has substantially a crescent shape, which is inte-
grally protruded from the ring portion 32. The ring portion 32
is arranged around the sound chamber 16, and the hooking
portion 34 is hooked on the user's auricle, as shown in FIG. 7.
Besides, the fixing unit 30 has a plurality of anti-sliding
portions 321 formed on an outer surface of the ring portion 32.

The anti-sliding portion **321** provides anti-sliding function to retain the in-ear-canal headset assembly of this embodiment on the user's auricle and improves wearing stability.

The in-ear unit **40** includes a covering lid **41** covering the sound chamber **16**, a wave-guiding tube **42** extending outward from the covering lid **41**, and a flexible tip **43** connected to the wave-guiding tube **42**. The flexible tip **43** is put in the user's external auditory canal.

The microphone unit **50** includes an arm **52**, an earphone plug **54** disposed at one end of the arm **52**, a microphone **56** disposed at the other end of the arm **52**, and a connecting cord **55** arranged on the arm **52**. The earphone plug **54** is plugged in the socket **18**. The earphone plug **54** is extended along a longitudinal direction of the arm **52**. The connecting cord **55** is electrically connected the earphone plug **54** and the microphone **56**.

For reducing total weight, in this embodiment, the connecting cord **55** is wavelike and passes through the arm **52**. The arm **52** of the microphone unit **50** is a plate-shaped and formed with a plurality of through holes **520**. The arm **52** preferably can be a metal plate, or an elastic plastic board. The connecting cord **55** is wavelike and passes through the through holes **520** and is alternatively arranged on two sides of the arm **52**. Such structure arrangement is different from the conventional way that uses a plastic tube to wrap and hold a connecting cord therein. This embodiment not only can reduce the weight of the microphone unit **50**, but also reduce the total thickness. The through holes **520** are arranged along a central line of the plate-shaped arm **52**, but it is not limited thereto. For example, the through holes can be in air communication with an edge of the arm **52**, or can be arranged at two sides of the central line of the arm **52**.

The earphone plug **54** and the microphone **56** of the microphone unit **50** are arranged on the identical side of the arm **52**. The arm **52** and the hooking portion **34** extend in opposite directions. Besides, in this embodiment, the socket **18** has a plugging slot **180**, and the plugging slot **180** is substantially configured in parallel to a human's cheek.

Please refer to FIG. 2. The sound chamber **16** and the neck portion **14** are shaped as a funnel. The sound chamber **16** is gradually narrowed from one end of the covering lid **41** toward the neck portion. The ring portion **32** of the fixing unit **30** has an inner opening **32a**, arranged adjacent to the covering lid **41** and an outer opening **32b**, arranged adjacent to the neck portion **14**. The inner opening **32a**, has a diameter larger than a diameter of the outer opening **32b**. In this embodiment, one end closed to the user's ear is defined as inner side, and the other end far away the user's ear is defined as outer side. In other words, the sound chamber **16** is oblique with respect to the resonance chamber **12**, and the ring portion **32** is tapered and ring-shaped. The ring portion **32** is assembled to the sound chamber **16**, and is coupled to the blocking protrusion **162** of the sound chamber **16**. Thus, the ring portion **32** can be stably mounted on the sound chamber **16**. Notably, a diameter of the covering lid **41** is larger than a diameter of the inner opening **32a**. The covering lid **41** and the blocking protrusion **162** cooperatively plug two sides of the ring portion **32**.

Please refer to FIG. 3 to FIG. 5. FIG. 3 is a perspective view of the in-ear-canal headset assembly of the instant disclosure. FIG. 4 and FIG. 5 are plan views. In this embodiment, the resonance chamber **12** is shaped as a flat soup bowl, which on one hand can provide room for resonance to the speaker unit **20**, and on the other hand can receive the socket **18**. Since the plugging slot **180** of the socket **18** is substantially parallel to user's cheek, the instant disclosure can reduce the thickness of the resonance chamber **12**. When user does not need to use

the microphone, the microphone unit **50** can be dismantled. The cable **19** connected to the computer extends into the resonance chamber **12**.

Please refer to FIG. 6, which is a cross-sectional view along a line 6-6 of FIG. 5 in the instant disclosure. An obtuse angle is formed between a channel axis **42x**, of the wave-guiding tube **42** and a channel axis **16x**, of the sound chamber **16**. An obtuse angle is formed between the channel axis **16x**, of the sound chamber **16** and an axis **12x**, of the resonance chamber **12**.

Please refer to FIG. 7, which is a perspective view of the in-ear-canal headset assembly being worn in accordance with the instant disclosure. After a user U wore the in-ear-canal headset assembly of this embodiment, the crescent-shaped hooking portion **34** of the fixing unit **30** is rested on user's ear E. The hooking portion **34** can increase the wearing stability, and work against the rotating torque. Besides, by the in-ear structure, the flexible tip **43** is put into user's canal to not only increase sound isolation effectiveness and isolate ambient noise, but also increase wearing stability of in-ear-canal headset assembly.

The descriptions illustrated supra set forth simply the preferred embodiments of the instant disclosure; however, the characteristics of the instant disclosure are by no means restricted thereto. All changes, alternations, or modifications conveniently considered by those skilled in the art are deemed to be encompassed within the scope of the instant disclosure delineated by the following claims.

What is claimed is:

1. An in-ear-canal headset assembly, comprising:
 - an accommodating housing having a resonance chamber, a sound chamber in air communication with the resonance chamber, and an outer cover arranged at a side of the resonance chamber, wherein a socket is received in the resonance chamber; wherein the accommodating housing further includes a neck portion in air communication with the resonance chamber and the sound chamber, wherein the sound chamber has a blocking protrusion arranged on a periphery thereof adjacent to the neck portion;
 - a speaker unit received in the sound chamber;
 - a fixing unit having a ring portion and a hooking portion connected to a periphery of the ring portion, the ring portion disposed around a periphery of the sound chamber;
 - an in-ear unit having a covering lid covering the sound chamber, a wave-guiding tube extending outward from the covering lid, and a flexible tip connected to one end of the wave-guiding tube; and
 - a microphone unit, having an arm, an earphone plug disposed at one end of the arm and plugged in the socket, a microphone disposed on another end of the arm, and a connecting cord fixed on the arm, wherein the earphone plug is extended along a longitudinal direction of the arm, wherein the connecting cord is electrically connected to the earphone plug and the microphone.
2. The in-ear-canal headset assembly according to claim 1, wherein the socket has a plugging slot, and the plugging slot is substantially configured in parallel to a human cheek.
3. The in-ear-canal headset assembly according to claim 1, wherein the sound chamber and the neck portion are shaped as a funnel, the sound chamber is gradually narrowed from one end of the covering lid toward the neck portion, wherein the ring portion of the fixing unit has an inner opening adjacent to the covering lid and an outer opening adjacent to the neck portion, a diameter of the inner opening is bigger than a diameter of the outer opening.

4. The in-ear-canal headset assembly according to claim 3, wherein a diameter of the covering lid is larger than a diameter of the inner opening, the covering lid and the blocking protrusion block two sides of the ring portion.

5. The in-ear-canal headset assembly according to claim 3, wherein the fixing unit has a plurality of anti-sliding portions formed on an outer surface of the ring portion.

6. The in-ear-canal headset assembly according to claim 1, wherein an obtuse angle is formed between a channel axis of the wave-guiding tube and a channel axis of the sound chamber, and an obtuse angle is formed between the channel axis of the sound chamber and an axis of the resonance chamber.

7. The in-ear-canal headset assembly according to claim 1, wherein the arm of the microphone unit is plate shaped, the arm has a plurality of through holes formed thereon and two sides, the connecting cord passes through the through holes and is alternately arranged on the two sides of the arm in a wavelike pattern.

8. The in-ear-canal headset assembly according to claim 7, wherein the earphone plug of the microphone unit and the microphone are arranged on a same side of the plate-shaped arm.

9. The in-ear-canal headset assembly according to claim 7, wherein the arm and the hooking portion extend in opposite directions.

* * * * *